

REMARKS

The Examiner has rejected claims 43–69. Claims 1–42 were previously canceled. Claim 69 has been amended to further recite the features of the invention; the scope of claim 69 remains unchanged. As a result, claims 43–69 are pending for examination with claims 43, 50, and 67 being independent claims. The amendments made find support in the specification, and do not constitute new matter.

Claim Rejections – 35 U.S.C. §112, second paragraph:

Rejection a. The Examiner has rejected claims 43, 50, and 67, and their dependent claims, under 35 U.S.C. §112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which Applicants regard as the invention. In particular, the Examiner states that, “Claims 43, 50 and 67 recite the limitation of ‘hole-punching’ which renders the claims indefinite.”

Applicant traverses the Examiner’s rejection and points out that in the original specification the term “hole-punching” is directly associated with the term “message” thus providing the phrase “hole-punching message.” Applicant further points out that the “hole-punching message” feature is clearly described in the specification.

The original specification provides:

“According to one aspect of the invention, device 100 formulates a message addressed to device 118 and sends it in step 400 of Figure 4a. ...the only purpose of this message is to induce the NAT 106 to set up the address mapping between devices 100 and 118. ... Device 100 has

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“punched a hole” through its own NAT, and device 118 is free to use that hole to initiate a traffic flow with device 100. ... **When device 100 sends the hole-punching message**, it, in essence, “invites” remote device 118 to communicate with it. (Of course, the hole-punching message is not really an invitation because it need not reach the remote device.) ... Note finally that if the hole-punching message is harmless...” (portions paras 27–30, also see FIG. 3; underlining and bold added for emphasis)

Accordingly, Applicant submits that claims 43, 50, and 67, and their dependent claims, particularly point out and distinctly claim the subject matter which Applicant regards as the invention. As such, Applicant respectfully requests that the Examiner withdraw the rejection.

Rejection b. The Examiner has rejected claims 43, 64, and 67, and their dependent claims, under 35 U.S.C. §112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which Applicants regard as the invention. In particular, the Examiner states that, “Claims 43, 64 and 67 recite the limitation of ‘immaterial’ which renders the claims indefinite.”

Applicant traverses the Examiner’s rejection and points out that the term “immaterial” is clearly described in the specification.

The original specification provides:

“Once the mapping is in place, the further disposition of the message is immaterial. The message may have a NULL content field and be discarded either in the network or upon arrival at device 118. If device

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118 were behind its own NAT (not shown), then the message would certainly be discarded by that NAT. None of this matters as the only purpose of this message is to induce the NAT 106 to set up the address mapping between devices 100 and 118." (portions para 27, also see FIG. 3; underling added for emphasis)

"...the hole-punching message is not really an invitation because it need not reach the remote device." (portions para 30; underlining added for emphasis)

Accordingly, Applicant submits that claims 43, 64, and 67, and their dependent claims, particularly point out and distinctly claim the subject matter which Applicant regards as the invention. As such, Applicant respectfully requests that the Examiner withdraw the rejection.

Rejection c. The Examiner has rejected claims 44 and 52 under 35 U.S.C. §112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which Applicants regard as the invention. In particular, the Examiner states that, "Claims 44 and 52 recite the limitation of 'harmless' which renders the claims indefinite."

Applicant traverses the Examiner's rejection and points out that the term "harmless" is clearly described in the specification.

The original specification provides:

"Note finally that if the hole-punching message is harmless, e.g., has a NULL content field, then it is safe to practice this method regardless

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of whether device 100 is behind a NAT or not.” (portions para 30;
underling added for emphasis)

Accordingly, Applicant submits that claims 44 and 52 particularly point out and distinctly claim the subject matter which Applicant regards as the invention. As such, Applicant respectfully requests that the Examiner withdraw the rejection.

Rejection d. The Examiner has rejected claims 45 and 53 under 35 U.S.C. §112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which Applicants regard as the invention. In particular, the Examiner states that, “Claims 45 and 53 recite the limitation of ‘wherein the network address translator is a plurality of network address translators coupled in series’ which renders the claims indefinite.”

Applicant traverses the Examiner’s rejection and points out that the recited feature is clearly described in the specification.

The original specification provides:

“Finally note that this hole-punching procedure works in the more general case where a computing device sits behind more than one NAT [Network Address Translator]. ... The hole-punching message travels through successive NATs, inducing a mapping in each one. Once the message is processed by the “outermost” NAT, the one with a public address (in Figure 5, this is NAT 502), the procedure is complete. Remote device 118 can use the series of holes by addressing a message to the public address of the outermost NAT. This procedure works even though

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the device 100 is unaware of the number of NATs between it and remote device 118...” (portions para 31, also see FIG. 5; underling and bold added for emphasis)

Thus the feature, “a plurality of network address translators coupled in series”, is described, at least in part, by the “successive NATs” of the specification. Further, FIG. 5 clearly shows an example of two NATs coupled in series (NAT 106 and NAT 502) in connection with the written description. Accordingly, Applicant submits that claims 45 and 53 particularly point out and distinctly claim the subject matter which Applicant regards as the invention. As such, Applicant respectfully requests that the Examiner withdraw the rejection.

Rejection e. The Examiner has rejected claim 46 under 35 U.S.C. §112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which Applicants regard as the invention. In particular, the Examiner states that, “Claim 46 recites the limitation of ‘wherein the creating and the sending of the hole-punching message is initiated by a network communications stack’ which is not clearly specified in the original specification or claims.”

Applicant traverses the Examiner’s rejection and points out that the recited feature is clearly described in the specification.

The original specification provides:

“The hole-punching procedure can be practiced automatically in a device’s network communications stack, and applications can remain

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ignorant of whether they are behind a NAT or in the public address space.” (portions para 30; underling added for emphasis)

The “hole-punching procedure” referred to is clearly described in the original specification, at least in paragraphs 27–31 and in FIGs. 3 and 4a–4c. Accordingly, Applicant submits that claim 46 particularly points out and distinctly claims the subject matter which Applicant regards as the invention. As such, Applicant respectfully requests that the Examiner withdraw the rejection.

Rejection f. The Examiner has rejected claims 48 and 54 under 35 U.S.C. §112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which Applicants regard as the invention. In particular, the Examiner states that, “Claims 48 and 54 recite the limitation of ‘wherein the remote device is behind an additional network address translator’ which is not clearly specified in the original specification or claims.”

Applicant traverses the Examiner’s rejection and points out that the recited feature is clearly described in the specification.

With respect to a device being “behind” a NAT, the original specification provides:

“Network Address Translators (NATs) automatically perform this translation by intercepting packets from the device with the private address (this device is said to be “behind” the NAT) and then replacing the device’s private address in the packet header with the NAT’s own public address.” (portions para 2; underling added for emphasis)

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And, in connection with the FIG. 1 example showing devices behind a NAT, the original specification also provides:

“Note that the success of the NAT’s translation scheme depends upon the fact that the computing device behind the NAT, here device 100, sends the initial message to initiate the traffic flow.” (portions para 25; underling added for emphasis)

And the original specification further provides:

“Thus, in the prior art, a computing device outside of a NAT cannot initiate a traffic flow directly with a device behind the NAT.” (portions para 25; underling added for emphasis)

Accordingly, the specification clearly discloses the concept of a device being “behind” a NAT. Further, the concept of a device being “behind” another device is well-known to those skilled in the art.

With respect to a “remote” device being behind an “additional” NAT, the original specification provides:

“This problem is compounded when each device is behind its own NAT. In this case, neither device can initiate the traffic flow” (portions para 3; underlining added for emphasis)

Thus, the feature, “the remote device is behind an additional network address translator” is described, at least in part, by “each device is behind its own NAT” of the specification. Accordingly, Applicant submits that claims 48 and 54 particularly point out and distinctly claim the subject matter which Applicant regards as the invention. As such, Applicant respectfully requests that the Examiner withdraw the rejection.

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Rejection g. The Examiner has rejected claim 69 under 35 U.S.C. §112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which Applicants regard as the invention. In particular, the Examiner states that, “Claim 69 recites the limitation of ‘The local device of claim 68 embodied on a computer-readable medium’ which describes a device to be in a computer-readable medium.” Applicant thanks the Examiner for pointing out this typographical omission.

Accordingly, claim 69 has been amended to provide:

“The local device of claim 68 embodied as computer-executable instructions on a computer-readable medium.” (underlining added for emphasis)

Accordingly, Applicant submits that claim 69 particularly points out and distinctly claims the subject matter which Applicant regards as the invention. As such, Applicant respectfully requests that the Examiner withdraw the rejection.

Claim Rejections – 35 U.S.C. §112, first paragraph:

Rejection a. The Examiner has rejected claims 45 and 53 under 35 U.S.C. §112, first paragraph, as containing new subject matter which was not described in the original specification or claims. In particular, the Examiner states that, “Claims 45 and 53 recite the limitation of ‘wherein the network translator is a plurality of network translators coupled in series’ which is not found [sic] the original specification or claims.”

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Applicant traverses the Examiner's rejection and points out that the recited feature is found in the specification.

The original specification provides:

"...this hole-punching procedure works in the more general case where a computing device sits behind more than one NAT. ... The hole-punching message travels through successive NATs, inducing a mapping in each one. ... Remote device 118 can use the series of holes by addressing a message to the public address of the outermost NAT. This procedure works even though the device 100 is unaware of the number of NATs between it and remote device 118..." (portions para 31, also see FIG. 5; underling and bold added for emphasis)

Further, FIG. 5 clearly shows an example of two NATs "coupled in series" (NAT 106 and NAT 502). Accordingly, Applicant submits that claims 45 and 53 do not introduce new subject matter. As such, Applicant respectfully requests that the Examiner withdraw the rejection.

Claim Rejections – 35 U.S.C. §102:

The Examiner has rejected claims 43, 47, 49–51, 55–63, and 67–68 under 35 U.S.C. §102(b) as being anticipated by Srisuresh, et al., (US 6,058,431) ("Srisuresh").

As both the sole inventor and the Agent currently prosecuting this case, Applicant submits it may be helpful to contrast typical network address translator ("NAT") functionality and the problems and shortcomings addressed by the methods and systems described in the present specification.

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A NAT typically performs an address translation for a device in a private address space behind the NAT such that the device can communicate with other devices in a public address space outside the NAT. This translation is typically performed by the NAT intercepting packets from the device with the private address and then replacing the device's private address with the NAT's own public address, after which the packets with the public address are sent along to the outside devices. Note that for a packet to be sent from a device outside the NAT and arrive at the device behind the NAT an appropriate mapping must have previously been established or the packet will be discarded by the NAT. (see the specification, "Background of the Invention" section starting on pg. 1)

This inability for a device outside a NAT to initiate unsolicited communication with a device behind the NAT is a problem that is addressed by the methods and systems of the present specification. For example, a local device that would like to enable future unsolicited communication with a remote device can format and send a hole-punching message addressed to the remote device. The hole-punching message induces any NATs positioned between the local device and the remote device to create address translation mappings. The disposition of such a hole-punching message subsequent to the creation of the mappings is immaterial. Such mappings may enable the remote device to subsequently initiate unsolicited communication with the local device behind the NAT. (see the specification, "Summary of the Invention" section starting on pg. 3, and the remainder of the written description)

Thus the specification describes various methods and systems which may resolve various problems and shortcomings, including some resulting from the use of NATs, by enabling the initiation of unsolicited communications between devices having one or more NATs interposed, such as when the non-initiating device is behind a NAT.

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Rejection a. Regarding independent claim 43, the Examiner states that the “hole-punching message” feature is disclosed in Srisuresh. Applicant traverses the Examiner’s rejection and points out that Srisuresh does not disclose a “hole-punching message” or the like. Accordingly, Applicant respectfully requests that the Examiner withdraw the rejections.

The original specification provides a “hole-punching message” feature as referenced in the **Rejection a, 35 U.S.C. §112, second paragraph arguments** herein above.

Further, the original specification also provides:

“...the hole-punching message is not really an invitation because it need not reach the remote device.” (portions para 30; underlining added for emphasis)

Srisuresh, on the other hand, provides:

“If a user on PC 108a initiates an outbound session (e.g., a FTP, Telnet or any connection involving the exchange of datagrams), it transmits data with the source IP address of 10.0.0.5 (i. e., its own locally significant IP address) and a destination IP address of 198.76.28.4 (e.g., an IP address of a target host).” (Srisuresh, column 5, lines 57–62; underlining added for emphasis)

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“If a user on PC 108a initiates an outbound session, it transmits a datagram with the source IP address of 10.0.0.5 (i.e, its own locally significant IP address) and destination IP address of 198.76.28.4 (e.g., an IP address assigned to another organization's stub network 110).” (Srisuresh, column 6, lines 14–18; underlining added for emphasis)

“For example, if a user on PC 108a initiates an outbound session (e.g., a FTP, Telnet or any connection involving the exchange of datagrams), it transmits data with the source IP address of 10.0.0.5 (i. e, it own locally significant IP address) and destination IP address of 138.76.29.7 (e.g., an IP address assigned to another target host).” (Srisuresh, column 7, lines 1–6; underlining added for emphasis)

“...datagrams—a self-contained, independent entity of data carrying sufficient information to be routed from the source to the destination computer without reliance on earlier exchanges or the transporting network.” (Srisuresh, column 2, lines 2–6; underlining added for emphasis)

Accordingly Srisuresh discloses data/datagrams being sent from a PC as part of a session. Nowhere does Srisuresh disclose or suggest a “hole-punching message” or the like that has as its only purpose inducing a NAT to establish a mapping between two devices and “need not reach the remote device”, as provided by the original specification.

Further, claim 43 calls for:

“...wherein any further disposition of the hole-punching message after the address mapping is created is immaterial.” (underlining added for emphasis)

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The original specification provides for this feature as referenced in the **Rejection b, 35 U.S.C. §112, second paragraph arguments** herein above.

Srisuresh, on the other hand, discloses a PC that “initiates an outbound session” such as an “FTP” or “Telnet” session. As known to those skilled in the art, such a session is operable to insure that session data is not lost, and that it is reliably delivered, thus making the disposition of data/datagrams in such a session very material—unlike the claimed features.

Accordingly, Srisuresh does not teach or suggest the feature of “any further disposition of the hole-punching message after the address mapping is created is immaterial”, as claimed. Moreover, Srisuresh teaches away from this feature by describing initiating sessions such as FTP or Telnet sessions wherein the data/datagrams are specifically intended to reach a destination device, such reliable delivery being the very purpose of such a session.

Accordingly, Applicant submits that claim 43 is not anticipated by Srisuresh under 35 U.S.C. §102(b). Further, claims 44–49 are dependent on claim 43. As such, claims 44–49 are believed allowable, at least in part, based upon claim 43.

Rejections d and e. Regarding independent claims 50 and 67, the Examiner states that the feature of “subsequent unsolicited communication sent from the remote device to the program via the network address translator”, the “program operating on a local device”, is described in Srisuresh. Applicant traverses the Examiner’s rejection and

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points out that Srisuresh does not disclose or suggest the claimed feature or the like. Accordingly, Applicant respectfully requests that the Examiner withdraw the rejections.

The original specification provides as background:

“The NAT translation scheme is based on the premise that the traffic flow is initiated by the computing device behind the NAT. The NAT must first set up the translation mapping before it can know how to handle traffic coming from the public network address space. Were a device in the public address space to attempt to initiate a traffic flow by sending a message to the public address of the NAT, then, upon receiving the message, the NAT would search for a translation mapping for the sender’s public address but would not find one. The NAT would discard the message, and the traffic flow would fail. This problem is compounded when each device is behind its own NAT. In this case, neither device can initiate the traffic flow: while the NAT of the traffic flow initiator sets up its translation mapping, the NAT of the recipient does not have an appropriate mapping and discards the incoming message. The traffic never starts flowing. As NATs proliferate, this shortcoming impedes the spread of any service based on direct device-to-device connectivity such as instant messaging, file transfer, remote control and management, and on-line meetings.” (para 3; underlining and bold added for emphasis)

The original specification further provides:

“According to the methods of the present invention, a local computing device enables remote devices to initiate traffic flows with it

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by sending initial messages addressed to the remote devices. If the local device is behind a NAT, then the NAT intercepts the messages and creates address mappings between the local and remote devices. When the remote devices initiate traffic flows, the NAT, if any, uses these pre-established mappings to send the traffic to the local device." (portions para 7; underlining and bold added for emphasis)

"Now that the mapping is in place, computing device 118 is free to initiate traffic flow 302 of Figure 3 with computing device 100. ... Device 100 has "punched a hole" through its own NAT, and device 118 is free to use that hole to initiate a traffic flow with device 100." (portions para 28; underlining and bold added for emphasis)

"...the hole-punching message is not really an invitation because it need not reach the remote device." (portions para 30; underlining added for emphasis)

Thus, a device behind a NAT makes use of a hole-punching message to establish a mapping within the NAT, the mapping allowing subsequent unsolicited communication to be initiated by a remote device.

Srisuresh, on the other hand, provides:

"If a user on PC 108a initiates an outbound session (e.g., a FTP, Telnet or any connection involving the exchange of datagrams)..." (Srisuresh, column 5, lines 57–59; underlining added for emphasis)

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“If a user on PC 108a initiates an outbound session, it transmits a datagram...” (Srisuresh, column 6, lines 14–15; underlining added for emphasis)

“For example, if a user on PC 108a initiates an outbound session (e.g., a FTP, Telnet or any connection involving the exchange of datagrams)...” (Srisuresh, column 7, lines 1–3; underlining added for emphasis)

Accordingly, Srisuresh discloses a user/PC that, “initiates an outbound session” such as an “FTP” or “Telnet” session. Nowhere does Srisuresh disclose or suggest a “hole-punching message”, much less a hole-punching message for the purpose of establishing a unique mapping in a NAT such that a remote device can initiate unsolicited communication with a device via the NAT, as claimed.

Accordingly, Applicants submit that independent claims 50 and 67 are not anticipated by Srisuresh under 35 U.S.C. §102(b). Further, claims 51–66 and 68–69 are dependent on claim 50 or 67. As such, claims 51–66 and 68–69 are believed allowable, at least in part, based upon claim 50 or 67.

Claim Rejections – 35 U.S.C. §103:

The Examiner has rejected claims 65–66 under 35 U.S.C. §103(a) as being unpatentable over Srisuresh in view of Berg et al (US 6,674,713 B1) (“Berg”).

Claims 65 and 66 are dependent on claims 50 and 67 respectively. As such, claims 65 and 66 are believed allowable, at least in part, based upon claim 50 or 67.

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Accordingly, reconsideration and examination of the above-referenced Application is requested.

CONCLUSION

Accordingly, in view of the above amendment and remarks it is submitted that the claims are patentably distinct over the prior art and that all the rejections to the claims have been overcome. Reconsideration and reexamination of the above Application is requested. Based on the foregoing, Applicant respectfully requests that the pending claims be allowed, and that a timely Notice of Allowance be issued in this case. If the Examiner believes, after this amendment, that the Application is not in condition for allowance, the Examiner is requested to call the Applicant's representative at the telephone number listed below.

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If this response is not considered timely filed and if a request for an extension of time is otherwise absent, Applicant hereby requests any necessary extension of time. If there is a fee occasioned by this response, including an extension fee that is not covered by an enclosed check please charge any deficiency to Deposit Account No. 50-0463.

Respectfully submitted,

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Date: July 26, 2006

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